

Sweetpotato Research Front

Kyushu National Agricultural Experiment Station (KNAES)

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Message from CGPRT Centre

Haruo Inagaki

The Regional Co-ordination Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT Centre)



I have been enjoying reading SPORF every time and I am very pleased to learn about the interesting studies carried out at KNAES. As a nematologist, I am personally interested in learning about the activities related to

sweetpotato which is a favorite food for the nematodes. Besides, I am officially very much interested in learning about the research on sweetpotato which is one of the mandate crops of the Centre. Sweetpotato is one of the important and indigenous crops in Indonesia. It can favorably be compared to potatoes (*Solanum* spp.) in its usefulness as stated by Dr. Masashi Kobayashi in No. 2 of SPORF. The archipelago of Indonesia, Irian Jaya in particular, is

considered to be one of the major receptacles of genetic resources of sweetpotato in the world. Currently a plan for preserving sweetpotato germplasm has been proposed by the Government of Indonesia which seeks the support from Japan. This plan involves not only the preservation of genetic resources of sweetpotato but also of the other crops for which diversity is rapidly decreasing. The CGPRT Centre is one of the institutes affiliated to UN · ESCAP and it is located in Bogor, Indonesia, one hour drive from Jakarta to the South. A branch laboratory of CIP (International Potato Centre) is also located in Bogor. I would like to recommend you to visit Indonesia to familiarize yourself with indigenous varieties of sweetpotato and to exchange views about your studies with scientists here. I would give you a word of advice "Look at the world, and your work".

I am looking forward for the next issue of SPORF.

Research Paper

Sweetpotato Dietary Fibers from Different Tissue Zones

Takahiro Noda, Yasuhiro Takahata and Tetsuo Sato
Laboratory of Crop Quality

Sweetpotato is an excellent source of dietary fibers as well as of starch. Dietary fibers are generally made up of cellulose, hemicellulose and pectin. They are considered to play a role in preventing diseases such as colon cancer. To develop a more efficient use of sweetpotato, extensive studies on dietary fibers are essential. In this study, we analyzed the composition of sweetpotato dietary fibers from different tissue zones.

The sweetpotato roots (variety: Koganesengan) harvested on Oct. 7 and separated into peel, cambium and inner-tissue were used for this study. Total dietary fiber was obtained from each sample by the amylase method. The yield of total dietary fiber was 3.78% for the peel, 2.21% for the cambium and 1.97% for the inner-tissue. The total dietary fiber was fractionated into pectin, hemicellulose and cellulose. The neutral sugar composition of each carbohydrate fraction was analyzed using high performance anion exchange chromatograph equipped with a pulsed amperometric detector. Figure shows the neutral sugar composition of total dietary fiber and pectin from each tissue zone. The total dietary fiber of the peel had a lower content of galactose (15.5%) and a slightly higher content of arabinose (11.6%), compared to others. There were considerable variations among the tissues in terms of sugar composition of pectic fractions. Namely, the peel pectin showed a high rhamnose (15.8%) and arabinose content (29.5%) and a low galactose content (50.7%). On the other hand, the hemicellulose and cellulose showed a similar

sugar composition among the different tissue zones (data not shown). These results indicated that a major difference in the properties of cell wall polysaccharides, especially pectic substances, occurs between the peel and the other tissues of sweetpotato roots.

Reference: T. Noda et al., *J. Appl. Glycosci.* 41 (3): 311-316 (1994).

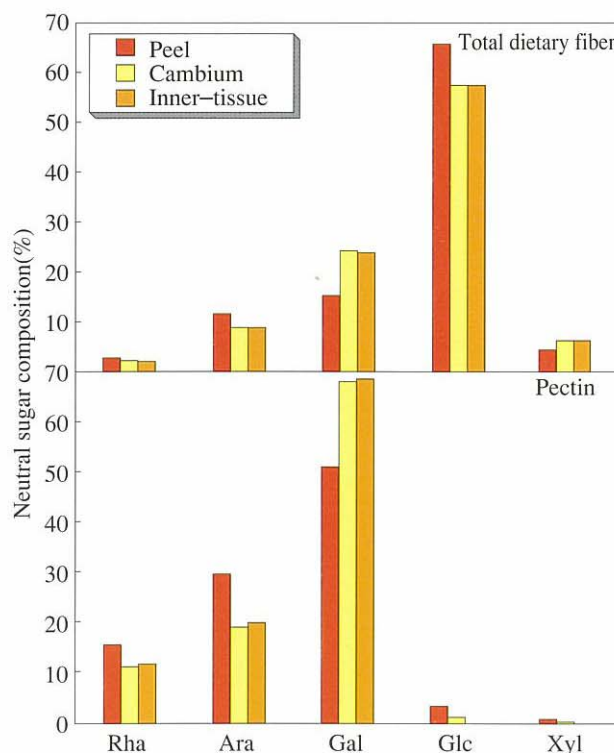


Fig. Sugar composition of total dietary fiber and pectin from different tissue zones of sweetpotato.

Research Paper

Response of Edible Sweetpotato to Cropping Systems

Mochida Hideyuki and Kobayashi Toru
Laboratory of Cropping Systems

Growth and yield of succeeding sweetpotato as influenced by preceding crops have been studied for three years. Six crops were cultivated as the preceding crop of edible sweetpotato (Sp) as follows: Radish (Ra), potato (Po), Italian ryegrass (Ir), cabbage (Ca), peanut (Pe), and guineagrass (Gu). Ra, Po, Ir, and Ca were cultivated in a rotation of two crops in a year and Pe was cultivated in a rotation of two crops in two years. Also Gu and Ra were cultivated in a rotation of three crops in two years. Two varieties of edible sweetpotato were tested for the experiment, Kokei-14 and Beniotome. The former was sensitive to a species of nematode, *Meloidogyne incognita* unlike the latter. However both of them were sensitive to another species of nematode, *Pratylenchus coffeae*.

Kokei-14 gave a higher yield due to the high harvest index when Ra, Ir, Pe and Gu were cultivated as preceding crop of sweetpotato (Fig. 1). In the case of Po and Ca the lower yield was due to the low harvest index. The nematode density was higher at the sites after harvesting Po and Ca than other crops, particularly for *M. incognita*. Therefore, the yield difference of sweetpotato between cropping systems was mainly caused by the nematode injury. Also the appearance of tuberous roots was poor when Po or Ca was cultivated as preceding crop. This trend was also observed about Beniotome, for which the difference in yield and nematode density became less appreciable due to the difference in sensitivity to the nematodes.

The higher yield was obtained for both varieties when Ir was cultivated as preceding crop. The soil contained much amount of potassium compared to nitrogen after harvesting Ir (Fig. 2). Po-

tassium was a very important element for the enlargement of tuberous roots. Therefore the much amount of potassium and high K/N ratio after Ir cultivation resulted in a high yield of sweetpotato.

These results suggest that it is important to incorporate resistant crops or resistant varieties into cropping systems. Also Ir which improves the chemical properties of soil was a suitable preceding crop for sweetpotato.

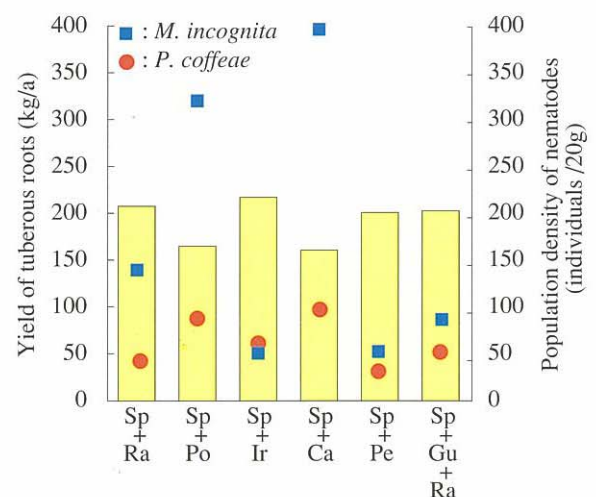


Fig. 1. Yield of sweetpotato (var. Kokei-14) and population density of nematodes

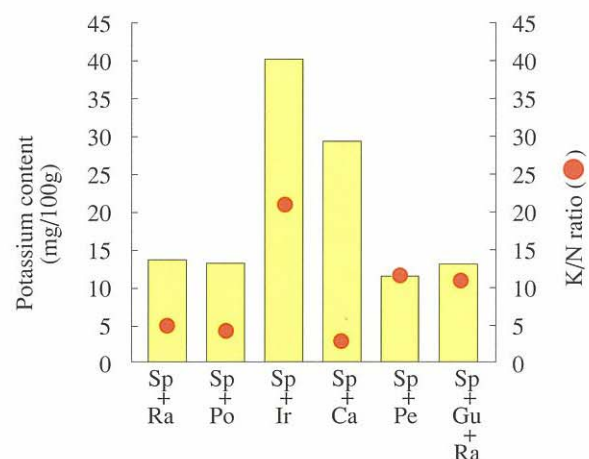


Fig. 2. Potassium content and K/N ratio after harvesting of preceding crops

Research News

Laboratory of Upland Soils (Miyakonojo)

Ground water is sometimes polluted by nitrates in upland areas and this environmental problem is currently spreading. Leaching water containing nitrates reaches the ground water presumably due to the application of nitrogen fertilizers in upland fields. To reduce the nitrate concentration in leaching water, it is recommended to cultivate crops which require small amounts of nitrogen fertilizer, such as sweetpotato. Soil improvement through the cultivation of

sweetpotato is being investigated in our laboratory.



Photo: Sweetpotato crop and instrument for collecting ground water.

Laboratory of Upland Crop Utilization

Laboratory of Upland Crop Utilization was newly established to research the utilization of upland crops in Oct. 1994, mainly sweetpotato

which is an important crop in the southern Kyushu district. Research subjects taken up in the laboratory are as follows:

- 1) Research of physiological functional components using various kinds of bacteria (antibacterial activity, antimutagenicity, and growth-promotion activity of yeast), human cultured cells (promotion of cell growth and anticar-

cinogenicity) and enzymes (hypotensive effect), as well as development of method for their utilization.

- 2) Utilization of waste from industrial production of starch and alcohol and byproducts.
- 3) Development of a new method of useful components (starch, amylase and polyphenols).



Building of Upland Crop Utilization

Research News

Sweetpotato Breeding Group Won an Award from the Japanese Society of Breeding

An award from the Japanese Society of Breeding was conferred upon the Sweetpotato Breeding Group of KNAES (representative; Osamu Yamakawa) on April 2, 1995. Dr.

Yamakawa gave a presentation entitled "Breeding of sweetpotato cultivars with multiple purposes for starch, processing and table use in the southern area of Japan" during the

award ceremony at Meiji University. The award was conferred on account of the release of five cultivars from 1985 to 1994.

- 1) "Shiroyutaka" released in 1985 was derived from the cross between "Kyukei 708-13" and "S684-6". It has a high starch content and high yield, and is suitable for the starch industry.
- 2) "Benihayato" released in 1985 was derived from the cross between "Centennial" and "Kyushu-66". It has a high carotenoid content and is suitable for food processing.
- 3) "Satsumahikari" released in 1987 was derived from the cross between "Kyushu-84" and "Kyushu-88". It has no beta-amylase activity. Therefore maltose is not produced during cooking. A new product like granules can be made from this cultivar.
- 4) "Beniotome" released in 1990 was derived from the cross between "Kyushu-88" and "Kyukei 7674-2". It has a good appearance and good taste for table use. Storage ability is fairly high.
- 5) "Joy White" released in 1994 was derived from the cross between "Kyushu-76" and "Kyushu-89". It has no beta-amylase activity and shows a high starch content. High quality sweetpotato alcohol with a good flavor can be produced from this cultivar.

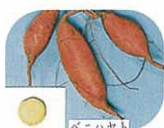
Sweetpotato breeding laboratory is targetting the development of new cultivars with a high content of plant pigments

like carotenoids (orange), anthocyanins (violet), and flavonoids (yellow). We hope that many colored materials for

food processing, for example, powder, paste and condensed juice will be extracted from these cultivars.



Shiroyutaka



Benihayato



Satsumahikari



Beniotome



Joy White



Members of Sweetpotato Breeding Staff of KNAES

Reader's Talk

Letters to the editor

SPORF will be useful to exchange information on sweetpotato research.

Lu Guoquan

**Special Plant Resources
Research Center,
Zhejiang Agricultural
University***

At first let me congratulate you on the publication of the first issue of sweetpotato research front (SPORF)! Thank you very much for sending me the first issue of SPORF. I think that the publication of this newsletter is a good news for all the sweetpotato researchers. I am envious that this newsletter will be useful for our sweetpotato research and also be a good way for us to exchange informa-

tion.

Since our research center is placing emphasis on the exploitation and utilization of special sweetpotato germplasm, the most important research fields for us are as follows: 1) collection, evaluation and utilization of special sweetpotato germplasm. 2) release of new cultivars with high yield, good quality, wide adaptability, multiple resistance and with special use or special value, etc. 3) development of new sweetpotato processed products after evaluation of special germplasm.

I feel that you will also be interested in those research fields. From the first Sino-Japanese sweetpotato and potato meeting we learned more about sweetpotato research in Japan, and knew

about your significant achievements during the past several years. We are interested in your studies which cover our research fields. I used to be a sweetpotato breeder when I was at Xuzhou Sweet potato Research Center and now I work on both sweetpotato breeding and processing at Special Plant Resources Research Center of ZAU. Therefore, I am interested in sweetpotato breeding and processing. So if possible we would like to initiate a research collaboration with your Station in those specific fields which will be beneficial for both of us.

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Announcements

Membership of SPORF is open to sweetpotato researchers of all nations, and SPORF members can receive the SPORF publication free of charge.

Also, contribution to "Letters to the editor" are welcome. As shown in the "Letter by Dr. Guoquan" in this issue, everyone can utilize SPORF as a forum to exchange information on sweetpotato research. You can introduce not only your current research field, future work plans and research strategy, but also calendar events, announcements and news about your department, organization or company. Please address all correspondence concerning editorial matters to the SPORF editor.

Editor's note

There is a Japanese saying, "Autumn with the sky clear and blue, and horses growing stout", which means that "Autumn harvest of many agricultural products is the best season for stimulating our appetite". Now SPORF members at KNAES are harvesting several sweetpotato cultivars for processing, and they evaluate their quality, etc.. As a result, our appetite is satisfied, and valuable information is derived from sweetpotato. (I.S)



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