Improvement in the anthocyanin content of purple-fleshed sweetpotato in Japan

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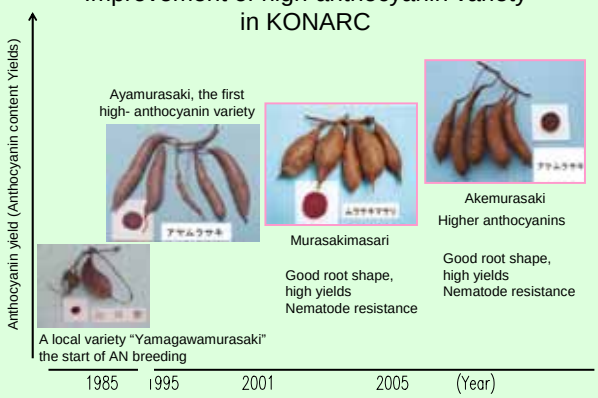
The anthocyanins from sweetpotato - promising natural food colorants -

- More stable to light and heat
- Superior in color tone to other anthocyanins
- The production estimated to be 160 tons (Its sales reached US $9 million)
- Physiological function
  - reduction of liver injury, antioxidative activities, antimutagenecity, antihypertension activity …….etc.

Processed products prepared by purple-fleshed sweetpotato

Improvement of high-anthocyanin variety in KONARC



The second variety “Murasakimasari”

From a cross between “Ayamurasaki” and “Kyukei No.174

Ayamurasaki (1995) | Murasakimasari (2001) | Akemurasaki (2005)

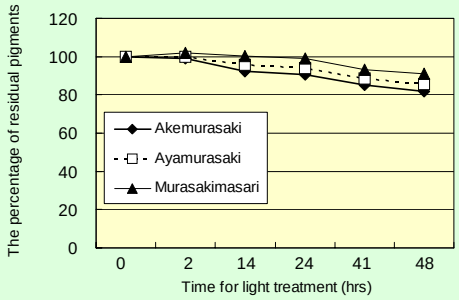
- Derived from a cross between “Ayamurasaki” and “Shiroyutaka (non-purple flesh)”
- Superior to “Ayamurasaki” in terms of storage root yield, root shape, and nematode resistance
- Not used for colorant production because of its slightly lower anthocyanin and slightly higher starch than that of “Ayamurasaki” (unfavorable for the process of anthocyanin extraction)
- Used mainly for food processing such as paste and alcohol (sweetpotato spirits)

The yields and traits of “Akemurasaki” in standard harvest

Yields and traits	Akemurasaki	Ayamurasaki	Murasakimasari
Root yield (kg/a)	262	250	257
No. of root per hill	3.0	3.2	4.0
Average root size (g)	240	212	172
Starch content (%)	22.1	22.8	24.1
Color value (10%E)[1)]	7.9	6.7	6.4
Color value (10%E)[2)]	9.9	6.5	6.2
Insects and diseases resistance			
Root knot nematode	Resistant	Medium	Resistant
Root lesion nematode	Resistant	Resistant	Resistant
Black rot	Resistant	Medium	Slightly resistant

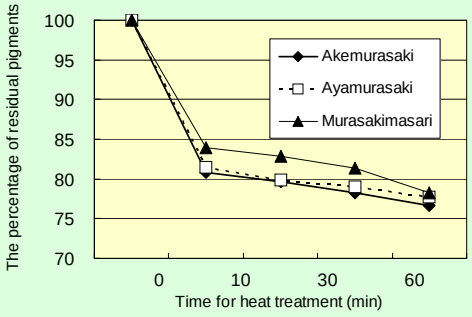
1) Standard cultivation without vinyl mulching between 2001 and 2004.
2) Early planting and late harvesting with vinyl mulching in 2002 and 2004.

The comparison of three anthocyanin varieties with regard to pigment stability to light



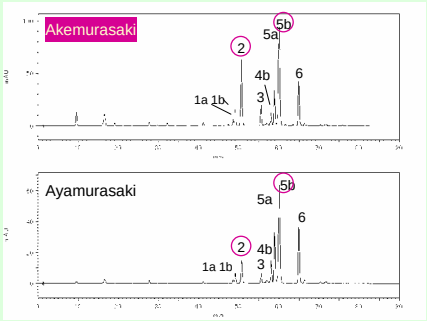
- Each extract was diluted with a McIlvaine’s buffer solution (adjusted O.D, 1.0; pH 3.0)
- Kept the extracts under fluorescent lamp (30,000 lux) in a refrigerator at 5 ˚C
- After light treatment, the extracts were measured spectrophotometrically at 530 nm

The comparison of three anthocyanin varieties with regard to pigment stability to heat



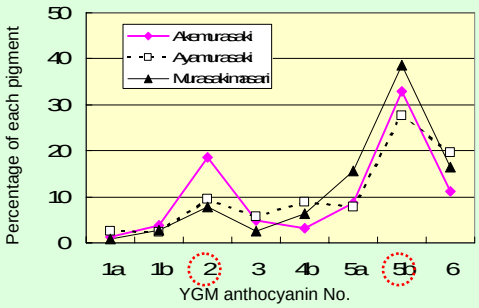
- Each extract was diluted with a McIlvaine’s buffer solution (adjusted O.D, 1.0; pH 3.0)
- Kept the extracts at 80 ˚C

HPLC chromatogram of Akemurasaki



Solvent systems: a linear gradient elution for 90 min from 15% to 50% solvent B (1.5% H_3PO_4, 20% CH_3COOH, 25% CH_3CN in H_2O) in solvent A (1.5% H_3PO_4 in H_2O).
Columns: Luna 3μ C18 (2) (100 mm x 4.6 i.d., Phenomenex)
Detection: 520 nm at 35 ˚C, Flow rate : 1 ml min^{-1}, Injection: 10 μL of the extract

Comparison of the anthocyanin composition of three high-anthocyanin varieties



YGM-2, 5b: monoacylated anthocyanins, others: diacylated anthocyanins

Comparison of three anthocyanin varieties with regard to paste color

Slightly less brightness as compared with 'Ayamurasaki' and 'Murasakimasari'

Conclusion

1. "Akemurasaki" is the variety with the highest anthocyanin content.
2. "Akemurasaki" contribute to the stable production of food colorants.
3. It is a challenge to improve anthocyanin stability, elucidating the effect of anthocyanin composition and polyphenol content on the stability.

A bottle of Akemurasaki anthocyanins

A bottle of portable SP anthocyanins