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Application News

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Probe Electrospray Ionization Mass Spectrometer

Direct and Rapid Analysis of Anthocyanin Pigment in Petunia Flower Petals Using DPiMS™-8060

In recent years, foods with function claims and functional plants are gaining great attention in the fields of food and agriculture in terms of preventing illnesses and improving health. It is expected that they will grow into a large industry.

As technological advances are being made daily to add high functions and high added values to plants, needs are growing for the establishment of technologies for measuring the substances that contribute to the functions and added values of developed and produced functional plants from the viewpoint of controlling the quality of such products.

With the intent to develop a rapid and simple method for measuring the substances which cause the high functions and values that are added to functional plants, this article introduces a pretreatment-free analysis method of anthocyanin pigment that exists locally in petunia flower petals. The method uses the newly developed DPiMS-8060 mass spectrometer (Fig. 1) which combines probe electrospray ionization (PESI), a novel ionization method, with tandem mass spectrometry.

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Fig. 1 **DPiMS™-8060**

Qualitative Analysis of Anthocyanin Pigment in Petunia Flower Petals

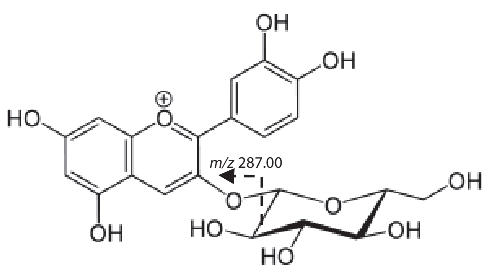
Square sections a few mm in size were cut from petunia flower petals and placed in sample plates for solid samples. Preparation for analysis is finished by simply dripping 35 µL of 50 % aqueous ethanol on the sample to promote ionization with no need for pretreatments such as extraction.

Substances of the flower petal placed in the sample plate are attached to the DPiMS-8060 probe tip by repeatedly piercing the petal. At the same time, a voltage is applied to the probe tip to ionize the sample that adheres to the probe surface and introduce it directly into the mass spectrometer. The probe used for sampling is ultrafine with a tip diameter of about 700 nm, allowing the measurement of analysis target substances in specific areas of the petal. This is not possible if employing pretreatment such as extraction.

Product ion scanning was used for the qualitative analysis of anthocyanin pigment in petunia flower petals. Table 1 lists the analytical conditions and Fig. 2 shows the result of a product ion scan.

Table 1 **Analytical Conditions Using DPiMS-8060**

Collision Energy	10 V
Mass Range	*m/z* 50-464
Scan Speed	3000 u/sec
Event Time	0.15 sec
Desolvation Line	300 °C
Heat Block	50 °C
Polarity	Positive
Acquisition time	0.2 min



cyanidin-3-glucoside
(MW=449.4)

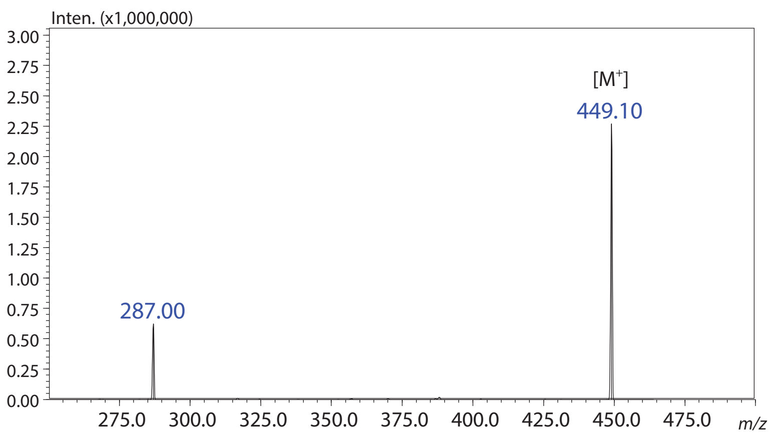


Fig. 2 **Structural Formula of Anthocyanin Pigment (Cyanidin-3-glucoside) and Product Ion Scan Result of a Standard Sample**

Local Distribution of Anthocyanin Pigment

Both the red area and white area of a petunia petal were sampled and analyzed by product ion scanning. The obtained qualitative results are compared as follows.

As shown in Fig. 3, anthocyanin pigment was found in the red area of a petunia flower petal, but not in the white area. This demonstrates that the correlation between anthocyanin pigment distribution and the color of a flower petal can be verified by mass spectrometry.

Since there is no need for pretreatment such as extraction or complicated operations using an analysis instrument, one sample can be analyzed in merely 0.2 min, indicating that the DPiMS-8060 can be used for rapid and simple measurements of substances contained or locally present in plants.

Conclusion

The anthocyanin pigment in petunia flower petals was rapidly detected by using the DPiMS-8060 without any pretreatment.

In addition, the local distribution of the anthocyanin pigment within petunia flower petals was measured easily.

These results suggest that for the quality control of foods with function claims and functional plants, the DPiMS-8060 may be used for the simple and rapid analysis of the substances which cause high functions and high added values.

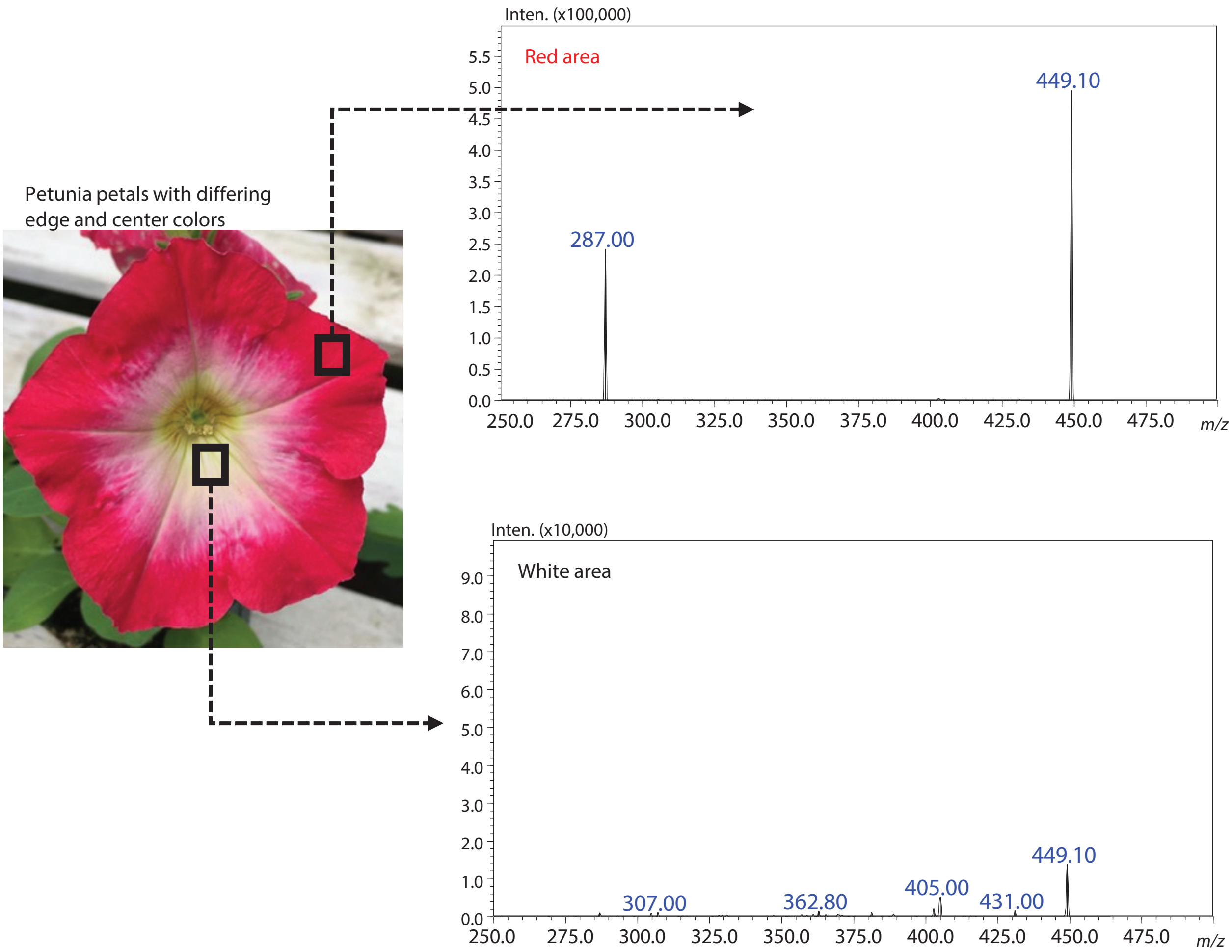


Fig. 3 **Product Ion Scan Results of Petunia Flower Petals**

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DPiMS-8060

Kit for Direct Probe Ionization Mass Spectrometer

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