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SHORT COMMUNICATION

INFLUENCE OF UV LIGHT ON THE BIOSYNTHESIS OF ANTHOCYANIN-LIKE PIGMENTS IN RIPENING BANANAS

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Abstract—New compounds behaving like 3-desoxyanthocyanidin have been found to develop in banana fruit skin (*Musa sapientum*) as the result of UV exposure

INTRODUCTION

VISIBLE light is essential for the biosynthesis of anthocyanin in bean seedlings,[1] endosperm tissue culture of 'Black Mexican' corn,[2] *Spirodella oligorhyza*,[3] Milo seedlings,[4] strawberry leaf discs[5] and *Sinapis alba* plants[6] and UV light has been found to promote anthocyanin formation in *S oligorhyza*[3] However, most studies so far have been on plants which naturally form anthocyanin pigment In banana, UV light[8] and γ-irradiation[9] has been reported to cause browning

During studies concerning the storage of bananas (*Musa sapientum* L. var Dwarf Cavendish), an unusual red colouration was observed on the skin due to the effect of UV light exposure, in contrast to the yellow of normally ripe bananas Since this red colour was similar to the red variety banana (*Musa coccinea*, locally known as 'Chandrabale'), the skin of which is known to have anthocyanins,[10] an attempt was made to characterize the pigments thus developed

RESULTS AND DISCUSSION

The chromatographic behaviour, colour and spectral characteristics (as shown in Table 1), together with the behaviour towards acid and alkali, of the pigments isolated from UV exposed Cavendish banana indicate that they are anthocyanins The phenolic character of the pigments was clearly indicated by their reaction with Folin-Denis reagent and diazotized benzidine Acid hydrolysis shows that the pigments are not glycosides. The R_fs and spectral characteristics, however, do not correspond to any known anthocyanidins.

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TABLE 1 CHROMATOGRAPHIC BEHAVIOUR AND SPECTRAL CHARACTERISTICS OF THE PIGMENTS

Pigment fraction	R_fs in solvent: Formic acid	R_fs in solvent: Forestal	Absorption maxima in 0 01% HCl in methanol (nm)	Colour: Visual	Colour: UV
A	0 17	0 55	488	Orange	Pink absorption
B	0 22	0 64	533	Pink	Pink absorption
C	0 14	0 63	536	Light Pink	Strong orange fluorescence

Note Trace amount of fawn coloured compound having a higher R_f than these pigments was also noticed

On the basis of the R_fs, colour and the stability of these pigments, they appear to be 3-desoxyanthocyanidins (J B Harborne, private communication) No such anthocyanin has been reported in other parts of banana plant [11] A similar red colouration was observed in 'Poovan' variety of banana, which was found to be proportional to the duration of the UV treatment

The necessity of light for anthocyanin development is well established [1-7] It appears that banana (*Musa sapientum*) has a dormant but weak anthocyanin forming system which, however, needs light of high energy for activation, UV irradiation has probably provided the required energy for the initiation and formation of this unusual anthocyanin

EXPERIMENTAL

Treatment Green bananas (80–85 days after fruit set and maturity equivalent to the market samples with pulp to peel ratio being 1–1 3) were spread on a platform after 24 hr of separation from the bunch, and exposed to irradiation from a 30 W UV (200–280 nm lamp) from a distance of 45 cm for 40 min The fruits were turned over after 20 min to maintain the uniform exposure

Extraction and purification of pigments The outer thin skin of brownish red banana (about 15 days of UV irradiation, stored at 18–20°), was separated from the peel and the pigments were extracted in cold in 0 1% methanolic HCl The extract was initially purified by ascending paper chromatography using *n*-BuOH–2 N HCl The different pigments were then separated by repeated paper chromatography using formic acid and Forestal solvents

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Key Word Index—*Musa sapientum*, Musaceae, 3-desoxyanthocyanidin, biosynthesis, UV light effect on pigment formation