two light steps: R-1, with an active band from about 700-780 nm and probably including some action throughout the red region; and R-2, a phytochrome mediated reaction requiring the presence of only a small amount of phytochrome in the far-red form (pfr).

The studies on action spectra suggest that light activates a flavo-protein (butyryl coenzyme A-dehydrogenase), which shows that the A ring of the flavonoid molecule is formed from 'acetate units.' It is found that increased sugar in the absence of light allows some anthocyanin formation and that leuco-anthocyanin synthesis is not light dependent. The quality of light plays an indirect role. Hence, if the leuco-anthocyanin synthesis is not light dependent and they differ from anthocyanins only in the middle (oxygenated) ring, then the light influences in some way the aliphatic chain (C-3 group) of the B-ring precursor, probably prior to cyclization. There may or may not be competition between anthocyanins and other classes of flavonoids.

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Inheritance of carotenoids in maize

Investigations on the inheritance of carotenoids, the yellow pigments of maize kernels, were carried out using Parent I, orange kernels (P-I, 2904A.31) and Parent II, colorless kernels (P-II, 2360P-8) colorgraded as 18 and 1 respectively, depending upon visual intensity of pigmentation. The two parents and F_1 and F_2 populations (similarly colorgraded between 18 and 1) were analyzed for total carotenoids as well as individual component carotenoids, the latter because of the fact that dark yellow/orange color may mask the presence of light colored components and so also the dilute colored components may show diluting effect on the darker pigments.

About 25 gm of whole kernels were extracted with ether to remove any wax coating from pericarps, 20 gm dried and powdered kernels (40 mesh) extracted twice with ca.200 ml portions of hexane-acetone-water, 15:75:10 V/V, and the slurry allowed to stand overnight. The supernatant was centrifuged at 2000 xg for 15 min, passed through a column of anhydrous sodium sulphate and exhaustively extracted with n-hexane. The extract was evaporated under vacuum in a thin-film flash evaporator (bath temp. 40 C) and made up to known volume (50 ml) using n-hexane. Absorbance was measured in a 10 ml aliquot at 435 nm and 450 nm and compared with a standard β-carotene calibration curve, and total carotenoids were expressed as β-carotene (ppm).

The individual carotenoids in a 40 ml aliquot of the above extract were separated chromatographically on a magnesia column. The first fraction (polyenes) was eluted with 5% acetone in hexane followed by elution of different fractions using hexane-acetone-ethanol V/V in the proportions of 90:10:0 for zeinoxanthin, 90:10:0 for cryptoxanthin, 89:10:1 for lutein, 88:10:2 for zeaxanthin and 80:10:10 for polyoxy pigments. After diluting the different fractions, the absorbance values were determined at the appropriate wavelength: phytoene (85), phytofluene (98), β-carotene (228), zeinoxanthin (268), cryptoxanthin (216), lutein (256), and zeaxanthin and polyoxy pigments (248). To estimate major components of the polyene fraction, the values used were: phytoene (285), phytofluene (330), β-carotene (480) and total polyene fraction (425).

Total carotenoids in the colorless parent were found to be 0.4 ppm, in the orange one as high as 68.5 ppm, and in the F_1 59 ppm. In the F_2 the total pigments were in between and in varying proportions. In the F_1 all those pigments present in the parents were detected. However, the proportions of zeaxanthin, lutein, carotenes and cryptoxanthin were less than those of zeinoxanthin and polyoxy pigments. Total carotenes were found to be more in colorless (42 ppm) than in colored (6 ppm) kernels of the parents, and in the F_1 only 5.8 ppm.

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