

On some constituents of *Bosea yervamora* fruits.

by

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ABSTRACT

In fruits of *Bosea yervamora* L. the occurrence of a betalain (betacyan) is established. Therefore, from a chemotaxonomic view, *Bosea* (resp. *Boseaceae*) must belong to the *Caryophyllales* (*Centrospermae*). The fruits contain the sugars glucose, fructose, sucrose, raffinose, and stachyose. The fatty-acid pattern of the saponifiable lipids of the fruits shows high percentages of palmitic, stearic and oleic acids.

RESUMEN

Se determina la presencia de una betalaina (betaciano) en frutos de *Bosea yervamora* L. Por consiguiente, desde el punto de vista quimiotaxonomico, *Bosea* (*Boseaceae*) tiene mayor afinidad con *Caryophyllales* (*Centrospermae*). Los frutos contienen azúcares del tipo glucosa, fructosa, sucrosa, rafinosa y estaquiosa. El ácido graso productor de lípidos saponificables del fruto, presenta altos porcentajes de ácido palmítico, esteárico y oleico.

According to KUNKEL, *Bosea yervamora*, usually placed into the family *Amaranthaceae*, should be segregated as a member of a separate family *Boseaceae*, which seems to him nearer related to *Anacardiaceae* than to *Amaranthaceae* (KUNKEL, 1975). It is well known (HEGNAUER, 1964) that in *Amaranthaceae* the betalains occur as a characteristic group of constituents which are also found in most other families of the order *Caryophyllales* (= *Centrospermae*). No occurrence of these red and yellow pigments except in *Caryophyllales* is known. Using a chemotaxonomic approach to the problem, we investigated the purple-coloured fruits (excellent illustration in KUNKEL and KUNKEL, 1974) of *Bosea* for their pig-

ments. Furthermore, the sugars and the fatty acids of total lipids of the fruits were examined qualitatively and quantitatively.

Fruits of *Bosea yervamora* L. were harvested on 29.3.1977 from a shrub in the lower part of the Barranco de las Cuevas Negras, near Los Silos, Tenerife. Approximately half of the fruits harvested had a purple-red colour, the others being still unripe, yellow or greenish-yellow. The fruits were dried at 60° C after being immersed into boiling water in a plastic bag for 5 min. The chemical investigation took place in Stuttgart, using the dried, pulverised material.

To distinguish betalains from anthocyanins, the method of MABRY et al. (1975) involving a cation-exchange column was used. In addition, the pigments extracted with methanol-water were separated by thin-layer-chromatography (silicagel, butanol/acetic acid/water 5 : 1 : 1). Both methods show the purple colour to be caused by a red betalain (betacyan). Perhaps a second minor betacyan is present in a very small amount, but this could not be proved conclusively.

The sugars of the fruits were investigated by paper-chromatographic methods (JEREMIAS, 1958). The following sugars were found:

glucose	1,3	% of dry-weight
fructose	1,5	•
sucrose	1,2	•
raffinose	0,2	•
stachyose	0,4	•

The occurrence of starch was demonstrated qualitatively. Concerning the quantitative measurements it must be remembered that we investigated a mixture of ripe and unripe fruits and, therefore, the amounts measured are probably lower than in fully ripened material.

Total lipids of fruits were extracted with chloroform-methanol. The lipid content is 5.4 % of dry weight. Saponification, esterification and separation of fatty acid methyl esters by gas-liquid-chromatography were accomplished as described (KULL and JEREMIAS, 1972). The following fatty acids could be identified (in % of total fatty acids):

myristic acid	0.3 %
palmitic acid	24.1 %
hexadecenoic acid	0.1 %
hexadecadienoic acid	0.1 %
hexadecatrienoic acid	0.1 %
stearic acid	23.1 %
oleic acid	43.5 %

linoleic acid	3,9 %
linolenic acid	2.0 %
arachidic or	
eicosaenoic acid	0.9 %
not identified: 4 peaks	tog. 1.0 %

The high content of stearic acid and the low percentage of linoleic acid may be due to the unripeness of a proportion of the fruits.

An occurrence of raffinose-sugars is known from seeds of a member of *Amaranthaceae* (*Amaranthus blitus*, DUPERON, 1955) and from barks of *Rhus* (*Anacardiaceae*, PARKER, 1962). The fatty acid pattern found is different from that of *Amaranthaceae* as described by HEGNAUER. For *Anacardiaceae*, only relatively inaccurate data of the fatty acid composition of seeds are reported (HEGNAUER). Only the low content of linoleic acid in *Bosea* would not be in full accordance with those data.

Most interesting from a chemotaxonomic point of view is the occurrence of a betalain in *Bosea* fruits. From this it must be concluded that *Bosea* and respectively a family *Boseaceae* are belonging to the *Caryophyllales* (*Centrospermae*). A near relationship to the *Anacardiaceae* therefore does not seem to exist.

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