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SHORT COMMUNICATION

# POLYACETYLENES IN *DAHLIA IMPERIALIS* AND *DAHLIA TENUICAULIS**

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**Abstract**—In the roots of *Dahlia imperialis* are 10 acetylenic compounds of which one polar substance could not be characterized. In *Dahlia tenuicaulis* there are 9 acetylenes, 6 of which were characterized.

## INTRODUCTION

*Dahlia imperialis* Roezl ex Ortgies and *Dahlia tenuicaulis* Sorensen have earlier been reported not to contain acetylenic substances.[1,2] *Dahlia tenuicaulis* Sorensen was formerly described under the name *Dahlia lehmanni* Hieron. A reinvestigation of these two woody dahlias has revealed a large series of acetylenic compounds in the roots.

## DISCUSSION AND RESULTS

Harvesting was carried out at the end of August 1969. The plants produced few flower heads, and so the flowers could not be properly investigated. Although both species contain UV absorbing materials suggestive of acetylenes. No acetylenic substances were observed in the green parts.

From extracts of roots and tubers of *Dahlia imperialis* the substances shown in Table 1 were isolated or determined.

TABLE 1. ACETYLENES FROM *Dahlia* SPECIES

| | COMPOUND | *D. imperialis* (mg/kg) | *D. tenuicaulis* (mg/kg) |
|---|---|---|---|
| I | $CH_3—CH=CH—(C\equiv C)_2—(CH=CH)_2—CH=CH_2$ | 1 | |
| II | $CH_3—CH=CH—(C\equiv C)_3—CH=CH—CH=CH_2$ | 12 | |
| III | $CH_3—CH=CH—(C\equiv C)_4—CH=CH_2$ | 1 | 1·3 |
| IV | $OCH—CH=CH—(C\equiv C)_3—CH=H—CH=CH_2$ | 50 | 11 |
| V | $OCH—CH=CH—(C\equiv C)_4—CH=CH_2$ | 10 | tr |
| VI | $AcOCH_2—CH=CH—(C\equiv C)_3—CH=CH—CH=CH_2$ | 20 | 8 |
| VII | $AcOCH_2—CH=CH—(C\equiv C)_4—CH=CH_2$ | 5 | tr |
| VIII | $HOCH_2—CH=CH—(C\equiv C)_3—CH=CH—CH=CH_2$ | <0·5 | |
| IX | $HOCH_2—CH=CH—(C\equiv C)_4—CH=CH_2$ | <0·5 | |
| X | $CH_3—CH\overset{t}{=}CH—(C\equiv C)_2—(CH\overset{t}{=}CH)_2—(CH_2)_4CH=CH_2$ | 0 | 50 |

* Chemical constituents of genus *Dahlia V.*

[1] F. KAUFMANN and J. LAM, *Acta Chem. Scand.* **19**, 1267 (1965).
[2] J. LAM, F. KAUFMANN and O. BENDIXEN, *Phytochem.* **7**, 269 (1968).

A polar substance with an UV spectrum showing maxima at 358, 333, 313, 293, 276 and 255 nm is present in both dahlia species in a very minute amount. It could not be fully characterized although the spectrum indicates a diene–diyne–diene conjugated system.

From *Dahlia tenuicaulis* roots and tubers were isolated III, IV, VI, whilst V and VII were present in trace amounts only (Table 1). The most abundant acetylenic compound present in this dahlia is X. Another, polar, acetylenic compound with the same chromophore ($\lambda_{max}$ at 337, 316, 296·5, 280, 267 and 253 nm) showing alcoholic, vinylic *trans* and *trans-trans* functions (IR) is oxidizable with active $MnO_2$. The UV spectrum of the oxidized product is shifted towards longer wavelength and has less distinct peaks compared to the spectrum of the original compound. It shows maxima at 357 (sh), 339, 320, 298 (sh), 276 and 265 nm. The compound, which apparently has an OH-group in an allylic position, may be $CH_3—CH=CH—(C\equiv C)_2—(CH=CH)_2—CH(OH)—CH_2CH_2CH_2—CH=CH_2$, and in this case is identical with the compound reported to be present in a dahlia hybrid as an acetate.[3] The same dahlia hybrid also contains X in a relatively large amount.

The compounds II–IX are frequently found to be present in dahlia tubers as well as in other genera belonging to Coreopsedinae, Heliantheae, while I and X have been only occasionally found in the genus *Dahlia*.[2,3]

## EXPERIMENTAL

Fresh, ground material from tubers and roots of each species was repeatedly extracted with $Et_2O$ and light petroleum (b.p. < 50°). Fresh material from leaves and flower heads was extracted with light petroleum and finally with $Et_2O$. The extracts were separately investigated. An extract possessing an UV spectrum indicating the presence of minute amounts of an acetylenic compound with an ene-triyne chromophore in a mixture with another substance also showing absorption in the UV region was obtained from the flower heads of *Dahlia imperialis*. A compound with an UV spectrum corresponding to a diene-triyne chromophore was isolated from the flower heads of *Dahlia tenuicaulis*. Separation and characterisation procedures have been described earlier.[2]

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[3] C. CHIN, M. C. CUTLER, E. R. H. JONES, J. LEE, S. SAGE and V. THALLER, *J. Chem. Soc.* (C) 314 (1970).