

FURTHER INVESTIGATIONS ON ANTIBIOTICS OF SEEDS

I. ANTIBACTERIAL AGENTS IN UMBELLIFERAE SEEDS

By

L. FERENCZY

Institute for Plant Physiology of University Szeged
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Following the previous investigations (1, 2) the antibacterial activity of the seeds of 96 species of *Umbellifera* family in natural condition has been observed. It is known from earlier examinations that the seeds of *Angelica*, *Pastinaca* and *Petroselinum* in vitro can inhibit the increase of certain Gram-positive bacteria. MARUZZELLA and LICHTENSTEIN (3) state that the seeds of *Apium* and *Anethum* show also antibacterial properties beside *Petroselinum*. *Umbelliferae* seeds already known of their antimicrobial effect have not been subjected to examination.

Materials and methods

Agar-diffusion technique (1) was employed: the seeds (2—3 years old¹) were sunk into solid broth agar of inoculated surface and the diameters of bacteria-free clear zones around the seeds containing the active substances were measured after 24-hour incubation at 30° C.

For test organisms Gram-positive *Bac. cereus* var. *mycoides* and Gram-negative *Xanthomonas malvacearum* were used.

Results and discussion

Umbelliferae seeds examined proved to be ineffectiv against *Xanthomonas*. In case of *Bac. cereus* var. *mycoides* definite clear zones appeared around the seeds of 8 species. The list of the seeds of active species and their activity are shown in *Table I*.

¹ I would express my gratitude G. BODROGKÖZY for having kindly lent his seed collection.

Table I.

names	diameters of clear zones in mm
Cuminum cyminum	10
Ferula narthex	7
Heracleum caucasicum	4
Heracleum mantegazzianum	8
Laserpitium siler	5
Opopanax chironthium	6
Pimpinella anisoides	5
Selinum carvifolia	2

Comparing these results with the previous one (1, 2) can be seen that relatively higher numbers *Umbelliferae* seeds contain (so far totally 13 species yielded positive results) such antibacterial compounds which can be diffused from intact seeds.

In all probability these compounds are not nothing but the volatile oils of *Umbelliferae* seeds. The reality of this assumption apart from MARUZZELLA and LICHTENSTEIN data (3) is supported by the following observation: according to experiments made with *Petroselinum* seeds the active substance can be rapidly extracted with ether from the seeds; the ethereal extract dropped and run on chromatographic paper (Sch & Sch 2043 b paper, isopropanol-ammonia-water = 10 : 1 : 1) the antibacterial compound of the seeds can be found at an identical area with the volatile oil; having the volatile oil evaporated the antibacterial activity ceases too.

Summary

Examining the antibacterial effect of seeds of 96 *Umbelliferae* species with agar-diffusion technique seeds of 8 species have been found active against *Bac. cereus* var. *mycoides* without inhibiting the increase of *Xanthomonas malvacearum*. Very likely the volatile oil of the seeds can be responsible for inhibition.

References

- (1) Ferenczy, L.: Occurrence of antibacterial compounds in seeds and fruits. Acta Biol. Hung., 6, 317-323 (1956).
- (2) Ferenczy, L.: Növénymagvak bakteriosztatikus hatása patogén baktérium-fajokra. (Bakteriostatische Wirkung von Pflanzensamen auf pathogene Bakterien). Acta Pharm. Hung., 26, 122-125 (1956).
- (3) Maruzzella, J. C., Lichtenstein, M. B.: The in vitro antibacterial activity of oils. Amer. Pharm. Ass., 45, 378-381 (1956).

Appendix

List of species examined:

Apium graveolens, *A. nodiflorum*, *Aithamantha cretensis*, *A. haynalli*, *A. hungarica*, *Anthriscus cerefolium*, *A. silvestris*, *A. vulgaris*

Biofora testiculata, *Bupleurum aristatum*, *B. falcatum*, *B. praealtum*, *B. protractum*, *B. ranunculoides*

Carum carvi, *Caucalis daucoides*, *C. muricata*, *Chaerophyllum bulbosum*, *C. hirsutum*, *C. temulum*, *Cicuta maculata*, *C. virosa*, *Cnidium apioides*, *C. silaifolium*, *Crithmum maritimum*, *Cuminum cyminum*

Ferula asa-foetide, *F. communis*, *F. nartex*, *Ferulago galbanifera*, *Foeniculum anisatum*, *F. vulgare*

Heracleum caucasicum, *H. lanatum*, *H. mantegazzianum*

Laserpitium latifolium, *L. peucedanoides*, *L. siler*, *Ligusticum sequeri*, *L. mutellina*

Myrrhis odorata, *Oenanthe fistulosa*, *O. peucedanifolia*, *O. pimpinelloides*, *O. silaifolia*, *Opoponax chironthium*, *Orlaya platycarpa*

Pastinaca sativa, *Peucedanum alsaticum*, *P. altissimum*, *P. arenarium*, *P. austriacum*, *P. carvifolia*, *P. cervaria*, *P. gallicum*, *P. officinale*, *P. oreoselinum*, *P. palustre*, *P. schottii*, *P. venetum*, *P. verticillare*, *Pimpinella anisoides*, *P. anisum*, *P. aromatica*, *P. peregrina*

Sanicula europea, *Scandix australis*, *S. balansae*, *S. pecten-veneris*, *Selinum carvifolia*, *Seseli annuum*, *S. dévériense*, *S. elatum*, *S. gracilis*, *S. hippomarathrum*, *S. leucospermum*, *S. montanum*, *S. osseum*, *S. rigidum*, *S. tenuifolium*, *S. tommasinii*, *S. tortuosum*, *S. varium*, *Silaum flavescens*, *Siler montanum*, *S. trilobum*, *Sison amomum*, *Sium erectum*, *S. lancifolium*, *S. latifolium*

Thalictrum banaticum, *Tordylium maximum*, *Torilis anthriscus*, *T. nodosa*, *Trinia glauca*.