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THE STROMA IN THE FUNGAL PATHOGEN OF SUNFLOWERS *PHOMOPSIS HELIANTHI* AND RELATED SPECIES

Jelena Vukojević and M. Muntañola-Cvetković
Institute of Botany, Faculty of Sciences, Takovska 43,
11000 Belgrade, Yugoslavia, and Institute for Biological Research, 29 Novembra 142, 11060 Belgrade, Yugoslavia

The initial appearance of the stromata, position in the culture plates, dimensions and overall shapes, complexity, time of ripeness and other features of these structures were found to be valuable parameters in distinguishing groups of taxa among 150 *Phomopsis* and/or *Diaporthe* isolates from ten plant species. Significant differences were found between the fungal pathogen of sunflowers *Phomopsis helianthi* Muntañola-Cvetković *et al.* and several congeneric fungi isolated from weeds growing in about 50 localities of Voivodina. Paraffin-sections showed the simple architecture of the pycniostromata in *P. helianthi* and consistently distinguished this species from the cultures forming complex stromata that had been recovered from *Phomopsis* conidiomata and/or *Diaporthe* ascomata found on soybean stems and on several common weeds.

The aim of this study was to investigate the fungal stroma in pure culture as a possible distinguishable morphological character with reference to species classification in the anamorph genus *Phomopsis*. Fungi isolated from a large number of collections of *Phomopsis* conidiomata and from ascomata of the teleomorph *Diaporthe*, found on spontaneously infected sunflowers, soybeans and weeds were studied under standardized conditions. Comparative studies included: initiation and patterns of distribution of the stromata on the colonies, developmental sequence of the inner constitutive elements of these structures such as ecto- and endo-stroma, pycnidial cavities, formation and location of the perithecia, dimensions and overall morphology of the stromata at their maturity.

Material and Methods

The plant material was collected during several years in about 50 localities of Voivodina in which the humid weather is usual. The isolation techniques were standard. Cultivation was carried out on PDA plates under the following ailyd conditions: 8h fluorescent white light, 4,500 K / 16 h dark; light intensity 27 μmol/sec/m^2; temperature 24°C. The stromata were lifted from the agar, placed in FAA fixing solution (25% formalin : 70% ethanol : 5% glacial acetic acid) and paraffin-embedded as described in previous papers (Muntañola-Cvetković *et al.*, 1991).

Results

A collection of about 600 microtome-cut permanent slides, contrast-stained with Safranin O - Light Green SF Yellowish, has resulted from this study. It is now preserved at the "Siniša Stanković" Institute for Biological Research in Belgrade. A selection of 20 colour photographs presented at the 13th International Sunflower Conference in Pisa, Italy, illustrates part of the results obtained.
The results indicate that the dimensions of the stromata can be influenced by several factors, such as nutrients, temperature and humidity; however, under standardized conditions each species shows a general, characteristic pattern.

Large stromata, about 2-10 mm in diam, protuberant and often coalescing, were formed, among others, by cultures isolated from: stems of *Arctium lappa* L. (strains producing only pycnidia, as well as those forming pycnidia and perithecia); *Daucus carota* L.; *Glycine max* (L.) Merr. (*Diaporthe phaseolorum* (Cke. & Ell.) Sacc. *f. sp. caulivora* Athow Caldwell, *D. phaseolorum* referred to var. *sojae* (Lehman) Wehmeyer in the past, *P. longicolla* Hobbs); leaves of *Hedera helix* L.; and fruits of *Olea europaea* L. The *Phomopsis* type-1 cultures (producing mostly α-conidia but no perithecia), isolated from *Xanthium italicum*, also belong to this group.

Middle-size stromata, 0.5-2.5 mm in diam, were formed by isolates from overwintered stems of *Cichorium intybus* L.; *Lactuca serriola* L.; *Sonchus arvensis* L.; and type-2 cultures from *Xanthium* spp., which produced not only pycnidia with mostly β-conidia (α-conidia were rarely seen), but also perithecia.

Small and simple stromata, up to 0.5 mm, were typical of *P. helianthi*, which did not produce perithecia in PDA cultures.

Conclusion

This investigation represents a new attempt to clarify the taxonomic position and relationships of the fungal pathogen of the sunflowers *P. helianthi*. The results have provided new evidence that *P. helianthi* is not conspecific with *P. arctii* (Lasch) Traverso.

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Studies on the Production condition of Apothecium of Sclerotinia sclerotiorum of sunflower (Brief report)

Hua Zhifu Qu Xiyun Liu Xuemin Zhao Hongbo
(Jilin Agriculture University)

The infection of Sclerotinia sclerotiorum of sunflower (head rot type) take place early or late and infected heavy or light depend on apothecia of the fungus appeared early or late and its number. So research on the necessory condition for formation of apothecia and the factors for production of apothecia in the field were important.

Tests on the production of apothecia affected by 5 different soil type (meadow soil, alkali soil, paddy soil, albic soil, aeolian sandy soil) of Jilin Province showed that the apothecia could formed in all the five soil types, it formed numerous in meadow soil (18/g. sclerotia) and less in alkali soil (10/g. sclerotia). Water potential of soil was the important condition for production of apothecia. Measure the water potential by soil moisture meter (mmHg.B type) showed that apothecia were formed at water potential -0.133 to -0.622 bars, most amount at -0.356 bars (51.5/g. sclerotia) and could not formed at 0 or -0.710 bars. Tests 5-30°C six different temperature affected the formation of apothecia showed that the apothecia formed most at 10°C (3.33/g. sclerotia) and did not formed at 5°C or 30°C. Light intensity and light quality also affected the formation of apothecia. Formation of apothecia occured both in scattered light (280 Lux./day) and strong light (12900 Lux./day), only stipes developed in the dark and could not formed even intial apothecia. The apothecia were formed in nomal day light and in yellow, red, green, violed-red light, and it required light at least 8 hours in every 24 hours, while in blue or orange light, it only formed initial apothecia but not could further develop.

At 1987-1989, in the field of Jilin Province, take an observation of the production of apothecia every 3 days in the same field started at May. It found that temperature, light, soil structure and soil pH value were not the limit factors for apothecia appeared in field. The major limit condition was humidity. During the three years observation, the apothecia appeared at the middle of August, the sooner or later depend on rainfall. In 1987, there was plenty of rainfall, there were 3 rain days from July 25-31 and 23 rain days in August, rains were frequently, the formation of apothecia began at the middle of August and continued to form. The number of apothecia reached 136/m². In the July of 1988, rainfall less than the same period of 1987, and at August there were some rainfall, the apothecia appeared(the most could reached 5.7/m².). But after August 22, continued dry caused the production of apothecia ceased. After September 3, there was some rainfall, a few apothecia appeared again. In 1989, from July 25 to September 9 continued dry weather, only a few rainfall. The apothecia did not produce. Then at 10-22 September, rainfalls came more, at 23 September, apothecia appeared (1.1/m².) According to 3 years observation, it was found that the condition of the production of apothecia was rainfall. Especially the rains in August. If it was five rain days among 10 days and the two times the rainfall above 10mm. the heavier one over 20mm.or 3 times above 10mm., the heavier one over 15mm., the apothecia produced. Then, if it continuous rain, the numerous apothecia formed, otherwise apothecia produced less or did not formed.