

PHYTOALEXIN TYPE RESPONSE OF SUNFLOWER STEMS TO SCLEROTINIA SCLEROTIUM
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Stalk rot of sunflower caused by Sclerotinia sclerotiorum (Lib.) deBary is a serious problem in some sunflower production areas. Research at this institution supports a concept that a phytoalexin-like response may be involved in sunflower resistance to this disease.

Both preformed and induced phenols were implicated initially in the resistance reaction. They accumulated in inoculated stem tissues and up to 12 cm above the lesion within three days at four-fold or more concentrations more than uninoculated tissues. Resistant varieties produced more than susceptible ones. The constitutive phenolics were not fungitoxic. An increase in phenylalanine ammonia lyase activity preceded the accumulation of phenols. Five or more antifungal compounds were synthesized in sunflower in response to S. sclerotiorum but only one appears to be a phenylpropanoid compound. Most of the antifungal putative phytoalexins appear to be polyacetylenes. These compounds are probably synthesized de novo.

Inoculation of the stem with S. sclerotiorum induced resistance within three days at least 12 cm above the lesion. This was confirmed by challenge inoculations with S. sclerotiorum. Induced compounds that were inhibitory to fungi appeared in the tissues with induced resistance.

The development of resistance and the production of the induced fungal inhibitors is dependent upon temperature. The expression of resistance is best at 27 C, a temperature that also allows maximum fungal growth. Resistance is greater at 30 C than at 24 or 27 C, but fungal growth is also inhibited at 30 C. An in vitro system was developed to assay for resistance to S. sclerotiorum in stems and petioles of sunflowers and this three day procedure can be performed prior to pollination. Results of in vitro assays of genetic materials correlated with field ratings of resistance.