BOTANY

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ABSTRACTS

Changes in Host-nuclear Macromolecules in Resistant and Susceptible Barley to Infection by *Erysiphe graminis* f. sp. *hordei* Culture CR3. Pradeep K. Bhattacharya, Indiana University Northwest, Gary, Indiana 46408.——The effects were cytofluorometrically determined of infection with CR3 culture of *Erysiphe graminis* f. sp. *hordei* on the levels of nuclear DNA, RNA, histone, non-histone, and total protein and on the size of the nuclei in the near-isogenic lines of resistant and susceptible barley coleoptile cells. Nuclear size, RNA, and non-histone protein content increased and histone content decreased by 18 hours after inoculation in both varieties, but the observed changes occur more rapidly after inoculation in the resistant variety than they do in the susceptible variety. DNA content decreased from 64 hours after inoculation. These results are similar to those reported for wheat rust system and indicate that profound changes in nuclear metabolism are induced by infection with the biotrophic fungi.

Optimum Growth Temperatures for *Pilobolus*. K. Michael Foos and Judith A. Royer, Department of Biology, Indiana University East, Richmond, Indiana 47374.——Optimum growth temperatures for *Pilobolus* have not been published in the literature. Most studies of *Pilobolus* growth reported in current as well as older papers have been done at "room temperature." This indicates a widely held belief that its optimum temperature for growth is "room temperature" (20-24 C). Rarely are isolates of *Pilobolus* incubated at temperatures above 25 C. This study of six isolates of *Pilobolus* indicates that these fungi grow actively in a range of temperatures between 5 and 40 C, and that the optimum temperature commonly lies between 30 and 35 C.

***Verticillim dahliae* as a Biocontrol Agent of Velvetleaf *Abutilon theophrasti*.** R.J. Green, Jr. and G.L. Wiley, Department of Botany and Plant Pathology, Purdue University, West Lafayette, Indiana 47907.——*Verticillium dahliae* appeared naturally in stands of velvetleaf (VL) *Abutilon theophrasti* in soybean/weed competition studies. Within three years, suppression of VL was almost 100% and the weed was non-competitive with soybeans. VL plants with symptoms were 97% infected and 84% of all plants without symptoms yielded *V. dahliae*. The soybean/weed competition studies were based on different weed population densities, row width and tillages. None of these variables had a measurable effect on soil populations of *V. dahliae*. Greenhouse studies showed initial host specificity of VL isolates of *V. dahliae*, however, serial passage of isolates through a number of test plant species, including soybean, showed that host specificity could be altered. The implications of this instability will be discussed in consideration of *V. dahliae* as a potential biocontrol agent.

Efficiency and Pattern of ^{65}Zn Incorporation into Soybean Seeds by Root Absorption, Stem Injection, and Foliar Application. ALAM KHAN AND C.M. WEAVER, Department of Foods and Nutrition, Purdue University, West Lafayette, Indiana 47907.——Hydroponically grown soybeans were intrinsically labeled with ^{65}Zn by root absorption, stem injection, and foliar application to see whether the method of labeling affects the efficiency of ^{65}Zn incorporation and distribution of Zn in seeds. The efficiency of root absorption of ^{65}Zn was the lowest (23.44%), foliar application was intermediate (37.85%) and stem injection was the highest (64.50%). Subcellular distribution of ^{65}Zn in seeds indicated few differences among the different labeling techniques. Solubility of ^{65}Zn from seeds labeled via root absorption, stem injection and foliar application was 66.83, 73.91, and 73.65% of the total flour ^{65}Zn respectively. More than 80% of the soluble ^{65}Zn activity remained in the supernatant at pH 4.5 regardless of the labeling techniques. About 16-20% of the supernatant ^{65}Zn was not dialyzable. The dialyzable ^{65}Zn is either free or attached to phytic acid, protein, or fiber which have low molecular weight. Thus, initial separation of soybean components containing ^{65}Zn did not reveal any difference due to labeling technique.

Incidence and Control of Cucurbit Powdery Mildew in Indiana. RICHARD X. LATIN, Purdue University, West Lafayette, Indiana 47907.——Powdery mildew threatens production of muskmelons, pumpkins and squash each year. The disease defoliates plants and results in decreased yields and reduced fruit quality. Two species of powdery mildew (*Erysiphe chicoracearum* and *Sphaerotheca fuliginea*) were identified in Indiana in 1986. *E. chicoracearum* was detected in locations in Tippecanoe and Monroe counties. Incidence of *S. fuliginea* was more widespread. Samples of mildew-infected leaves collected from commercial muskmelon, pumpkin, and squash fields in 17 counties yielded conidia of *S. fuliginea*.

Control of mildew on other cucurbits is achieved with applications of systemic fungicides. In experimental field plots of muskmelons and pumpkins, traditional systemic fungicides such as benomyl performed poorly; while relatively new compounds such as triadimefon provided excellent control under severe disease pressure.

Ultrastructure of Articulated Laticifers in *Stapelia bella* (Asclepiadaceae). THOMAS E. MAXAM AND KATHRYN J. WILSON, Indiana University-Purdue University, Department of Biology, P.O. Box 647, Indianapolis, Indiana 46223.——The ultrastructure of articulated laticifers in stems of *Stapelia bella* was studied. Articulated laticifers form a coherent system of branching cells, whose cross walls rarely breakdown, and that are located near vascular tissue and nonarticulated laticifers in the stem. Large tissue pieces were prefixed for 48 hrs. and small pieces excised and fixed in a Modified Karnofsky's Fixative for an additional 18 hrs. Tissue was postfixed in 2% osmium tetroxide, dehydrated to pure acetone, and embedded in Spurr resin. Articulated laticifers possess a dense peripheral cytoplasm around a large central vacuole. Plasmodesmata are common. The plasma membrane is highly convoluted producing a vesicular outer cell boundary. Rough endoplasmic reticulum occupies the cytoplasm in concentric rings. Leucoplasts and mitochondria are present. A most unusual feature is a highly convoluted multiple membrane system commonly present in place of a tonoplast.

Aquatic Plant Distribution and Mapping of Selected Ponds of Miller Woods, Indiana Dunes National Lakeshore. PEGGY L. RUCKMAN AND RICHARD L. WHITMAN, Department of Biology, Indiana University Northwest, Gary, Indiana 46408.——The interdunal ponds of the Miller Woods area were mapped during 1984-85 as part of a larger organismal study. These ponds lie in a topography of ridges and swales, and may be

classified as mature to pre-senescent. Pond surface area, perimeter and shoreline development were determined for vernal, aestival and semi-permanent ponds within the study area. Aquatic plant distributions were mapped for three semi-permanent ponds (Ponds 30, 33 and 35) in the vicinity of the Douglas Environmental Education Center. The most important plant in the marginal zones was *Carex* spp., which grew in association with *Iris virginica shrevi* and *Dryopteris thelypteris pubescens.* The emergent plant zone of these ponds was dominated by *Scirpus acutus* and *Typha* spp. *Nuphar* and *Nymphaea* were abundant in the floating leaf zone. *Ranunculus flabellaris* commonly occurred where bottom sediments became exposed. Dominant submerged plants consisted of *Myriophyllum* sp. and *Potomogeton* spp. During 1985-86, *Zizania aquatica*, wild rice, extensively reduced the open water zone of Pond 35.

Comparative Effects of Abscisic Acid and Indole Acetic Acid on Phospholipid Bilayers. WILLIAM STILLWELL AND DANIEL BELCHER, Department of Biology, AND STEPHEN WASSALL, Department of Physics, Indiana University-Purdue University at Indianapolis, Indianapolis, Indiana 46223.——Both indole acetic acid (IAA) and abscisic acid (ABA) have been shown to enhance the permeability of phospholipid membranes to the nonelectrolyte erythritol and to the cation Pr^{3+}. Since these molecules are of similar size and have almost identical pKa's, it seems reasonable they effect membranes by similar mechanisms. The experiments reported here are an initial attempt to distinguish the effects of these two hormones on lipid bilayers. pH studies show that IAA is effective at enhancing bilayer permeability in both its dissociated and undissociated forms while ABA is ineffective as an anion. ABA enhances permeability only for mixed component bilayers, and is ineffective for membranes made of pure phosphatidylcholine (PC). IAA on the other hand greatly enhances permeability for pure PC membranes. We suggest ABA effects membranes at the interface between two different phospholipid types while IAA binds to the head group of PC enhancing permeability but not effecting the fatty acyl component.

Histochemical Observations of Embryogenesis in Suspension Cultures of *Asclepias tuberosa* (Asclepiadaceae). KATHRYN J. WILSON AND KERRY B. DUNBAR, Department of Biology, Indiana University-Purdue University at Indianapolis, Indianapolis, Indiana 46223.——Embryogenic *Asclepias tuberosa* suspension culture tissue was fixed, embedded in paraffin, sectioned, and stained with safranin and fast green. Stages of suspension culture embryogenesis are similar to those of zygotic embryogenesis. Pro-embryoids were observed as rapidly dividing cells surrounded by a thick common cell wall. The presence of three celled pro-embryoids in 7 day old suspension cell clumps suggests a single cell origin of embryoids. Globular, heart, torpedo, and mature embryoids also were observed in the suspension culture tissue. The earlier stages of embryogenesis were observed to have either thin suspensor-like structures or thick multicellular stalks. Month-old mature embryoids became disorganized and began to form a callus tissue. The disorganization of embryoids late in culture growth is a reason for selecting younger embryoids for regeneration experiments. Disorganized embryoid tissue may prevent embryoids from germinating normally.