429. **Constructed wetlands for municipal wastewater treatment: Recent experience in Oklahoma.**
Wright, S. G.; Shields, R. T.; and Thung, H. J.
In: Versatility of Wetlands in the Agricultural Landscape. (Held 17 Sep 1995-20 Sep 1995 at Hyatt Regency, Tampa, Fla.) Campbell, K. L. (eds.)
St Joseph, Mo.: American Society of Agricultural Engineers (ASAE); pp. 665-673; 1995.
NAL Call #: QH87.3.V47 1995
Descriptors: groundwater flow/ ponding/ design/ land types/ artificial wetlands/ wastes/ sewage effluent/ treatment/ waste water treatment/ evaluation
Abstract: Recent design, construction and operating experience at 3 subsurface flow constructed wetlands in Oklahoma, USA, are discussed. Ponding, septic conditions and poor effluent quality were attributed to a complexity of interrelated biological, physical, chemical, hydrological and hydraulic factors and to insufficient information concerning best site specific design criteria.

430. **A holistic passive integrative sampling approach for assessing the presence and potential impacts of waterborne environmental contaminants.**
Petty, J. D.; Huckins, J. N.; Alvarez, D. A.; Brumbaugh, W. G.; Cranor, W. L.; Gale, R. W.; Rastall, A. C.; Jones-Lepp, T. L.; Leiker, T. J.; Rostad, C. E.; and Furlong, E. T.
Chemosphere 54(6): 695-705. (Feb. 2004)
NAL Call #: TD172.C54; *ISSN:* 0045-6535
Descriptors: artificial wetlands/ wastewater treatment/ water sampling/ sampling methods/ environmental monitoring/ membranes/ monitoring instruments/ pesticides/ polycyclic aromatic hydrocarbons/ chemical pollution/ environmental assessment/ mercury/ sampling/ samplers/ sewage disposal/ aromatic hydrocarbons/ chlorine compounds/ sewage & wastewater treatment/ species interactions: pests and control/ characteristics, behavior and fate/ water & wastewater treatment
Abstract: As an integral part of our continuing research in environmental quality assessment approaches, we have developed a variety of passive integrative sampling devices widely applicable for use in defining the presence and potential impacts of a broad array of contaminants. The semipermeable membrane device has gained widespread use for sampling hydrophobic chemicals from water and air, the polar organic chemical integrative sampler is applicable for sequestering waterborne hydrophilic organic chemicals, the stabilized liquid membrane device is used to integratively sample waterborne ionic metals, and the passive integrative mercury sampler is applicable for sampling vapor phase or dissolved neutral mercury species. This suite of integrative samplers forms the basis for a new passive sampling approach for assessing the presence and potential toxicological significance of a broad spectrum of environmental contaminants. In a proof-of-concept study, three of our four passive integrative samplers were used to assess the presence of a wide variety of contaminants in the waters of a constructed wetland, and to determine the effectiveness of the constructed wetland in removing contaminants. The wetland is used for final polishing of secondary-treatment municipal wastewater and the effluent is used as a source of water for a state wildlife area. Numerous contaminants, including organochlorine pesticides, polycyclic aromatic hydrocarbons, organophosphate pesticides, and pharmaceutical chemicals (e.g. ibuprofen, oxindole, etc.) were detected in the wastewater. Herein we summarize the results of the analysis of the field-deployed samplers and demonstrate the utility of this holistic approach.

Wetlands as Agricultural Conservation Practices

431. **A comparison of subcanopy versus overhead application of constructed wetland treated nursery runoff on short and long rotation nursery crops.**
Arnold, Michael A.; Lesikar, Bruce J.; Mcdonald, Garry V.; and Wilkerson, Don C.
Journal of Environmental Horticulture 22(4): 217-224. (2004)
NAL Call #: SB1.J66; *ISSN:* 0738-2898
Descriptors: methods and techniques/ pollution assessment control and management/ terrestrial ecology: ecology, environmental sciences/ bog like free surface flow wetland cell/ gravel filtration sub surface flow wetland cell/ field equipment/ subcanopy irrigation/ water reuse/ applied and field techniques/ non point source pollution/ nursery industry/ nursery runnoff/ product quality/ water conservation
Abstract: The nursery/greenhouse industry is the fastest growing segment of U.S. agriculture. Consumer demand for excellent product quality requires luxury applications of water and agricultural chemicals. These cultural practices tend to yield significant volumes of runoff rich in nutrients and pesticides. A capture and recycle system at the Nursery/Floral Crops Research and Education Center at Texas A&M University was fitted with 12 gravel filtration sub-surface flow (SSF) and 12 bog-like free-surface flow (FSF) wetland cells. Three cells of each type were planted with Canna x genera/is Bailey 'Cherry Red', Iris L. x 'Clyde Redmond', both species, or no wetland plants. Runoff was continually collected from the nursery and recycled through wetland cells prior to application via overhead impact sprinklers or subcanopy microsprinklers. Short-term (10 wk) differential effects between overhead and subcanopy irrigation during production of Frarinus pennsylvanica, Pistacia chinensis von Bunge, Quercus virginiana P. Miller, and Taxodium distichum (L.) Richard in 9.4 liter (3) containers or Ilex vomitoria W. Aiton 'Nana' and Catharanthus roseus G. Don in 5.8 liter (2) containers were limited in magnitude. However, overhead irrigation reduced height and caliper growth or injured the foliage compared to plants irrigated with subcanopy microsprinklers during

longer-term (14 months) production in large 87.9 liter (27) containers. The extent of reduction was species dependent with Pinus elliottii Englemann being minimally impacted, Pyrus calleryana Descaisne 'Bradford' intermediate. and Lagerstroemia L. x 'Basham's Party Pink' (purportedly a Lagerstroemia indica L. x Lagerstroemia fauriei B. Koehne hybrid) and T. distichum exhibiting more pronounced effects. Damage appeared to be largely a result of high dissolved salt concentrations in irrigation water contacting the foliage. Recycling of runoff through the FSF cells concentrated soluble salts more so than passing the water through the SSF cells. Efficacy of nitrate nitrogen removal varied with species, season, loading rate, and wetland type. However, the constructed wetlands were generally effective under our test conditions at maintaining effluent nitrate levels at ltoreq10 mg/liter (10 ppm) when loading rates were ltoreq50 mg/liter (50 ppm). Presence of emergent wetland plants (those with roots imbedded in the substrate and shoots extending above the water surface, rather than floating or submerged plants) in the system was more important for effectively reducing nitrate levels in effluent from SSF than from FSF cells.